compared with the parental forms from which they had emanated. The result of this correspondence with orchid-growers of all classes in all countries, as well as with collectors and botanists, was that the Hamburg Professor became the depositary of the greatest amount of orchid-lore yet accumulated, and the possessor of the largest stores of materials relating to the order. Unhappily his synthetic faculty was by no means so strong as his acquisitive tendencies were great and as his analytical powers were developed; so that much is left for his successors to accomplish in collating and expounding his work. In no place in the world can this be done so readily as at Kew, so that on all accounts it is earnestly to be hoped that the late Professor's herbarium and notes may find their way to that establishment, where Lindley's collections are already enshrined.

Reichenbach was almost exclusively a systematist. He had little to say on morphological questions, and less on the biological points which lend such great interest to the study of the order. Speculations were made the subject of sarcasm by him, and to the last it may be doubted whether he had any great amount of sympathy with those researches which have furnished the clue to the explanation of the extraordinary and highly diversified structure of orchid-flowers, and illustrated alike its genetic and its physiological significance. Nevertheless, as in his lifetime he was constantly and disinterestedly at the service alike of his brother naturalists and of the orchid-growing community, shrinking from no labour or trouble where an orchid was concerned, so in that future reconstruction of the order on morphological and physiological principles which is inevitable, the botanist, be he who he may, will find himself as much indebted to the labours of Reichenbach, as unable to proceed without constant reference to them, as are the students of the present day. His title to our gratitude is indefeasible; it will be even more so to our successors.

NOTES.

THE Croonian Lecture, "Les Inoculations Préventives," will be delivered at the Royal Society to-day, by Dr. Roux, of the Pasteur Institute, Paris.

THE ship *Hvidjörnen* arrived at Copenhagen on May 21 from Greenland, having on board Dr. Fridtjof Nansen and his companions, who succeeded in crossing Greenland from east to west on snow shoes. The members of the expedition received an enthusiastic welcome from a large crowd.

THE anniversary meeting of the Royal Geographical Society, for the election of President, Council, &c., will be held in the hall of the University of London, Burlington Gardens, on Monday, May 27, at 2.30 p.m., General R. Strachey, F.R.S., C.S.I., President, in the chair. After the presentation of the Royal medals for the encouragement of geographical science and discovery, the annual address on the progress of geography during the year will be delivered by the President.

AN International Congress of Chronometry will be opened at the National Observatory, Paris, on September 7. An influential organizing Committee has been formed, of which Vice-Admiral de Fauque de Jonquières has accepted the presidency. Those who wish to become members should communicate with the secretary, M. E. Caspari.

CONGREGATION has approved of the nomination of Dr. William Huggins, F.R.S., as a visitor of the Oxford University Observatory, in place of the late Dr. Warren de la Rue.

ACCORDING to the Rome Correspondent of the *Daily News*, the Pope has decreed, owing to the wishes expressed by Padre Denza more than a year ago, that the works for the Astronomical Observatory, to be erected in the Vatican, are to be begun at once. The site selected is the tower over the rooms occupied by the Master of the Sacred College, it being the most elevated building of the Vatican Palace. The cost is estimated at a million of francs.

MR. W. P. JOHNSTON, Government Electrician, Calcutta, died on April 23, at Darjeeling. According to *Allen's Indian Mail*, Mr. Johnston had served for over twenty years in the Indian Telegraphs, and had specially distinguished himself in the scientific branch of the Department, his researches in connection with duplex telegraphy, the working of river cables and long stretches of land lines, having been unusually productive of good results. He was also one of the first to improve the telephone after its introduction into India.

IT is reported in the Chinese Press that the Marquis Tsêng, so well known in Europe as the Ambassador of China to this country, has been appointed to the control of the Foreign Science College in Pekin.

PROF. MILNE, of the University of Tokio, whose work in connection with the investigation of earthquake phenomena is well known to all readers of this journal, is in England for a short time on leave of absence.

DR. JOHN GIBSON, who has for some time been engaged in superintending the physical work of the Fishery Board for Scotland, has recently completed a series of investigations which are likely to throw considerable light on the problems connected with ocean currents. The detailed results will appear in the next Annual Report of the Fishery Board; but from a preliminary note communicated to the Royal Society of Edinburgh it appears that two chemically distinct kinds of sea water are present in the North Sea. The difference between these two waters is rendered perfectly distinct by sufficiently accurate determinations of the relation between chlorine and density, and is not due to river water flowing into the North Sea. Water in which the relative proportion of chlorine is high reaches the North Sea from the surface of the Atlantic, round the north of Scotland and also through the English Channel, while water in which the relative proportion of chlorine is low flows into the North Sea from the north, and has been found on the surface as far north as 79° N. lat. The determinations of chlorine and density in the samples of ocean water collected during the *Challenger* Expedition, as published in the *Challenger* Reports, seem to show that similar differences of composition exist in ocean waters. To judge from these determinations, the mass of ocean water, especially in southern latitudes, approximates in chemical composition to that flowing as above mentioned into the North Sea from the surface of the Atlantic. The water in which the relative proportion of chlorine is less appears to have been met with chiefly to the north of the equator and to the south-west of the principal outlets from the Arctic Ocean. This, as well as its chemical composition, seems to point to an Arctic origin.

A SEVERE earthquake occurred at Plevlje, in Bosnia, at 3.43 a.m., on May 8. It lasted three seconds, the direction of the shocks being from west to east.

SEVERAL shocks of earthquake occurred on April 26 in Schwyz, and at Schaffhausen and Wilchingen.

ON May 20 a waterspout burst over the district of Crimmitzschau, in Saxony. Two persons were drowned at the town of that name, and a third at the neighbouring village of Lauterbach.

THE British Consul at San José, in Costa Rica, in his latest report says that a Meteorological Institute has been established at San José, and several useful observations have been taken, especially of recent earthquakes. He adds that the year 1888 did not have a very propitious closing, for just two days before the end of the year, the capital and surrounding districts were visited with several severe shocks of earthquake. The first shock took place on December 29 at 8 p.m. This was followed by another at 11 p.m., and on Sunday, December 30, at 4.21 a.m., by the most severe of all, lasting 25 seconds, and of such force as to cause considerable damage to the principal buildings in San José, and to nearly all the churches, besides private houses, few of which escaped damage. The morning was pitch dark, and hundreds of people, in all kinds of costumes, hurried into the Central Park looking for their friends, not knowing what might happen or whether any portion of their houses would be left to them. Several houses have been condemned by the authorities, and have had to be pulled down, whilst energetic measures are being taken to repair the damage done to the principal buildings, and the Government have erected temporary shelters for the poor who have been rendered homeless. The total damage is estimated at half a million sterling.

THE half-yearly meeting of the Council of the Italian Meteorological Society was held on April 28. Padre Denza referred to the activity of the Society during the previous six months, during which time several observing stations had been added in Italy and at Malta and Punta Arenas (South America); and to the working of the hygienic stations established at Florence and several other important cities. He also referred to the various Conferences which are being held in accordance with the decisions of the general meeting at Venice last year, for the purpose of popularizing meteorological science in Italy. Special investigations are being carried out with the view of determining the amount of carbonic acid gas in the air, and with regard to the system of the winds in the South Atlantic. The questions of sunshine and phenological observations were also discussed, and the importance of issuing general instructions for these subjects, and for the regular geodynamical observations at the Society's stations.

AT the meeting of the Scientific Committee of the Royal Horticultural Society on May 14, Mr. Wilson made some remarks on the question of the protection of fruit-trees against winter moths. He observed that the plan recommended in the *Agricultural Gazette* of October 15, 1888, of making a ring of cart grease and Stockholm tar round the bases of fruit-trees, though very effectual in catching large quantities of wingless females, had not prevented them from attacking the trees altogether, as the leaves on certain trees thus treated (as described at the Scientific Committee on January 15, 1889) were all going at the present date. At the same meeting Dr. Masters exhibited several photographs of plants from Madeira, including one of *Phytolacca dioica* as a large tree with a massive base of confluent roots, the usual form of this plant in Europe being a herb.

AT the last meeting of the Chemical Society of Göttingen, Dr. Buchka announced the results of his investigations upon the composition of bromide of sulphur. Balard long ago showed that sulphur readily dissolves in bromine with formation of a ruby-red liquid; this liquid, as more recently shown by Mr. Pattison Muir, may be freed from excess of bromine by means of a current of dry carbon dioxide. On attempting, however, to subject it to distillation, it is found to boil at about 200° C., but with decomposition. Indeed it is possible, by repeated distillation, to completely dissociate it into sulphur and bromine. Hence it has never hitherto been possible to analyze a sample of the redistilled liquid, and so there has been a certain amount of doubt as to its composition. Most of the analyses hitherto published have pointed to the formula S_2Br_2, but Guyot ascribes to it the formula SBr_2. Hence Dr. Buchka has attempted the distillation of the crude product under diminished pressure, and finds that the experiment entirely succeeds at the low pressure of 20 mm. of mercury, the red liquid passing over without the least sign of decomposition at a temperature of 111°-113°. Analyses of this redistilled liquid confirm the formula S_2Br_2. Hence bromide of sulphur resembles the monochloride, S_2Cl_2, the most stable of all the chlorides of sulphur: it differs from the chloride, however, in being more unstable, and only volatilizable without decomposition at a pressure not much exceeding 20 mm. of mercury.

FORMALDEHYDE, CH_2O or H . COH, the first member of the important series of aldehydes, has been synthesized by Prof. Jahn, of Cronstadt, Hungary, in a most instructive manner. During the course of Dr. Jahn's well-known researches upon the volumetric estimation of hydrogen by means of palladium, it was noticed that the presence of carbon monoxide always considerably disturbed the occlusion of the hydrogen by the palladium. As there was a possibility that some of the hydrogen had bodily united with the carbonic oxide with formation of formaldehyde, it was determined to repeat the experiment upon a larger scale and in a more suitable form of apparatus. A mixture of carbon monoxide and hydrogen was therefore led over a layer of spongy palladium, and the products passed through a series of bulbs containing water. On detaching the bulbs the odour of aldehyde was readily perceived, and the contents at once reduced an ammoniacal silver nitrate solution with formation of the silver mirror characteristic of aldehydes. Hence it was quite evident that the carbon monoxide and hydrogen had partially united in the pores of the palladium with production of formaldehyde. Two litres of the mixed gases were found quite sufficient to give a good silver mirror. This reaction is all the more interesting in view of Dr. Loew's recent synthesis of formose, $C_6H_{12}O_6$, an artificial member of the glucoses, by condensation of formaldehyde with calcium hydroxide; for as carbon monoxide is readily prepared by passing oxygen over excess of heated carbon, it may be said that glucose has been built up directly from its elements —carbon, hydrogen, and oxygen.

THE officials of the Australian Museum, Sydney, are now engaged in working at the Percoid Fishes, and the trustees announce that they will be glad to make exchanges in this group with the authorities of other museums.

THE Paris Correspondent of the *Daily News* says the Zoological Society of France has warned the French Government that a great ornithological calamity is impending. The Department of the Bouches du Rhône has hitherto been one of the chief landing-places for swallows coming from Africa. Engines for killing them, formed of wires connected with electrical batteries, have been laid in hundreds along the coast. When fatigued by their over-sea flight, the birds perch on the wires and are struck dead. The bodies are then prepared for the milliner, and crates containing thousands of them are sent on to Paris. This has been going on for some years, and it has been noticed this spring that swallows have not landed on the low-lying coast, but have gone farther west or east, and that they go in larger numbers than formerly to other parts of Europe. There are places, says the Zoological Society in its petition, where they used to be very numerous, but which they have now deserted, although there has been no falling-off in the gnats and other flying insects on which they live.

MISS E. C. JELLY, F.R.M.S., proposes to issue shortly a catalogue of the published species of recent Polyzoa, with a full synonymy. The main lines followed are those of Hincks and Waters. Only a limited number of copies will be printed, and application for them must be made to the authoress.

THE State University of Iowa has begun to issue what promises to be an excellent series of Bulletins from its laboratories of natural history. No systematic biological survey of the State has yet been attempted, and the editors of the new

Bulletin do not suppose that it will be in their power to provide such a survey. They propose, however, to bring before their readers some idea of the natural history of Iowa, and of the manner in which it may be studied; hoping in this way to stimulate an interest in such things sufficient to lead to greater results in the future.

AN interesting note, by Mr. Arthur A. Rambaut, on some Japanese clocks lately purchased for the Dublin Science and Art Museum, has been reprinted from the Proceedings of the Royal Dublin Society. These clocks, though differing in other respects, agree in this particular, that the time is recorded, not by a hand rotating about an axis, but by a pointer attached to the weight, which projects through a slit in the front of the clock-case. This pointer travels down a scale attached to the front of the clock, and thus points out the hour. Mr. Rambaut has consulted several persons who have been resident for some time in Japan, but none of them has ever seen clocks of like construction in actual use. A young Japanese gentleman to whom the specimens have been shown, says that he has heard of such clocks being used in rural parts of Japan about twenty or thirty years ago, but that they have been almost completely superseded by clocks made on the European plan.

THE fact of intermittence in the intensity of some sensations is known to physiologists. Thus, the tick of a watch withdrawn gradually from the ear begins to be heard, by turns, distinctly and indistinctly, then times of silence alternate with the sound. M. Couetoux, in the *Revue Scientifique*, calls attention to an analogous experience he has had in the case of vision. Looking at a distant windmill, with four vanes, he could not make up his mind whether it was in slow motion (like a nearer one); for, of the three vanes projected against the sky, he saw now one, now another; but the intermittent degradation of the sensorial impression prevented his observing two successive positions. These sensorial fluctuations seem to deserve careful study.

AT a recent meeting of the Manchester Section of Chemical Industry, Mr. William Thompson read a paper on the heat-producing powers of twelve samples of coal, determined by burning in oxygen (in the apparatus devised by him), compared with their theoretical values as calculated from their chemical composition. The coal which he found to give the highest results as regards heat-producing was anthracite, which gave 8340 Centigrade units of heat. Next came Pendleton coal, with 7736 units; then Wigan coal, 7552; and the lowest of the twelve came from near Atherton, with 6448 units. The results obtained by experiment were higher in two coals than the calculated results obtained by determining by heat units given by the combustion of the carbon, hydrogen, and sulphur found by analysis, but deducting the hydrogen, which appears always to be in combination with the oxygen present, so that its hydrogen does not produce heat on burning. In two coals the heat found by calculation and that found by experiment were the same, and in seven coals the heat found by calculation was greater than that found by experiment. A short discussion followed the reading of the paper.

THE additions to the Zoological Society's Gardens during the past week include a Rough Fox (*Canis rudis* ♂) from Demerara, presented by Mr. James Coombe; a Derbian Wallaby (*Halmaturus derbianus* ♂) from Australia, presented by Mr. Buckland, s.s. *Britannia*; two Great Eagle Owls (*Bubo maximus*), European, presented by the Executors of the late Mr. W. J. Cookson; two Red-legged Partridges (*Caccabis rufa*) from the Canary Islands, presented by Captain Augustus Kent, s.s. *Fez*; six Barbary Turtle Doves (*Turtur risorius*) from North Africa, presented by Major T. Erskine Baylis, F.Z.S.; a Black-bellied Sand Grouse (*Pterocles arenarius* ♂) from India, presented by Mrs. Ayrton Pullan; a —— Falcon (*Falco* sp. inc.) from Australia, presented by Baron F. von Mueller, C.M.Z.S.; a Tuberculated Iguana (*Iguana tuberculata*) from Spanish Honduras, presented by Mr. J. B. Johnson, s.s. *Antilles*; a Grey-breasted Parrakeet (*Bolborhynchus monachus*) from Monte Video, presented by Mrs. Macnab; ten Common Vipers (*Vipera berus*) from Surrey, presented by Mr. C. F. McNiven; two Common Vipers (*Vipera berus*) from Gloucestershire, presented by Mr. Barry Burge; a Chimpanzee (*Anthropopithecus troglodytes* ♂) from West Africa, two Cormorants (*Phalacrocorax carbo*), British, deposited; a Mountain Ka-ka (*Nestor notabilis*) from New Zealand, a Green-headed Tanager (*Calliste tricolor*) from South-East Brazil, purchased; five North African Jackals (*Canis anthus*), a Japanese Deer (*Cervus sika* ♀) a Collared Fruit Bat (*Cynonycteris collaris*), a Great Kangaroo (*Macropus giganteus* ♂), born in the Gardens.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 MAY 26—JUNE 1.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on May 26

Sun rises, 3h. 56m.; souths, 11h. 56m. 48·8s.; daily increase of southing, 6·5s.; sets, 19h. 58m.: right asc. on meridian, 4h. 13·8m.; decl. 21° 13′ N. Sidereal Time at Sunset, 12h. 16m.

Moon (New on May 29, 17h.) rises, 3h. 2m.; souths, 9h. 36m.; sets, 16h. 24m.: right asc. on meridian, 1h. 52·8m.; decl. 6° 16′ N.

Planet.	Rises.		Souths.		Sets.		Right asc. and declination on meridian.			
	h.	m.	h.	m.	h.	m.	h.	m.	°	′
Mercury..	5	4 ...	13	34 ...	22	4 ...	5	51·4 ...	25	12 N.
Venus.....	2	41 ...	9	47 ...	16	53 ...	2	3·9 ...	11	55 N.
Mars......	4	12 ...	12	23 ...	20	34 ...	4	39·9 ...	22	41 N.
Jupiter....	22	18*...	2	14 ...	6	10 ...	18	29·6 ...	23	3 S.
Saturn....	9	16 ...	16	53 ...	0	30*...	9	11·1 ...	17	27 N.
Uranus...	15	20 ...	20	50 ...	2	20*...	13	8·3 ...	6	34 S.
Neptune..	3	58 ...	11	45 ...	19	32 ...	4	1·5 ...	19	2 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

May.	h.	
26 ...	16 ...	Venus in conjunction with and 4° 30′ north of the Moon.
31 ...	16 ...	Mercury in conjunction with and 1° 53′ north of the Moon.

Variable Stars.

Star.	R.A.		Decl.				h.	m	
	h.	m.	°	′					
U Cephei	0	52·5 ...	81	17 N. ...	May	26,	0	30	*m*
					,,	31,	0	9	*m*
R Crateris	10	55·1 ...	17	44 S. ...	,,	27,			*M*
W Virginis	13	20·3 ...	2	48 S. ...	June	1,	1	0	*M*
δ Libræ	14	55·1 ...	8	5 S. ...	May	27,	22	33	*m*
U Coronæ	15	13·7 ...	32	3 N. ...	June	1,	21	0	*m*
U Ophiuchi... ...	17	10·9 ...	1	20 N. ...	May	27,	1	42	*m*
			and at intervals of				20	8	
β Lyræ...	18	46·0 ...	33	14 N. ...	May	27,	20	30	*M*
					,,	31,	2	0	*m*
U Aquilæ	19	23·4 ...	7	16 S. ...	June	1,	3	0	*M*
S Vulpeculæ ...	19	43·8 ...	27	1 N. ...	May	28,			*M*
S Sagittæ	19	51·0 ...	16	20 N. ...	,,	29,	2	0	*m*
					June	1,	2	0	*M*
δ Cephei	22	25·1 ...	57	51 N. ...	May	31,	23	0	*M*

M signifies maximum; *m* minimum.

Meteor-Showers.

	R.A.	Decl.	
	290° ...	60° N. ...	May 30. Short, slow.
From Vulpecula	305 ...	25 N. ...	Swift.
,, Lacerta...	330 ...	48 N. ...	Very swift.
Near ι Pegasi...	333 ...	27 N. ...	Swift, streaks.